



National Institute of Standards and Technology

Smart Grid Synchrophasor Standards  
and SynchroMetrology Laboratory Support

Summary Webinar  
Quarterly Report No. 1  
(October 2010 –January 2011 period)

March 23, 2011  
Transmission and Distribution DEWG Meeting

By:  
Nader Farah  
President  
ESTA International, LLC

# Agenda

---

- Project Background
- Project Scope
- Progress During the Reporting Period
- Planned Activities for the Next Reporting Period
- Project Status
- Contacts

# Project Background

---

- The 2007 Energy Independence and Security Act (EISA) tasked NIST to coordinate the development of interoperability standards.
- NIST initiated a set of Priority Action Plans (PAP) – including PAP 12 & PAP 13
  - PAP 12 focus is on harmonization of DNP 3.0 (IEEE 1815) and IEC 61850 (<http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/PAP12DNP361850>)
  - PAP 13 focus is on harmonization of IEEE C37.118.2 and IEC 61850 and Precision time (<http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/PAP1361850C27118HarmSynch>)
- NIST released a public tender for consulting services in July 2010 to expedite harmonization of standards and support the activities of PAP12 and PAP13 and, enhance its SynchroMetrology facilities.
  - NIST outlined a detailed scope of work to accelerate the harmonization between standards for measuring equipment and communication relevant to measurement of grid conditions by Phasor Measurement Units (PMUs) and standards that cover substation automation, transmitting data from field equipment within the substation and beyond.
  - The scope also included support for the further development of the NIST SynchroMetrology Laboratory to extend its capabilities to support future communication standards and interoperability testing.

# Selection of Consultant

---

- Through competitive procurement, NIST selected ESTA International, LLC (ESTA), an energy strategy and technology advisory firm and its subcontractor Quanta Technology LLC (QT), an energy technology consulting firm, to support this program.
- The ESTA/QT team and the NIST project team launched the project with a kick-off meeting in October 2010 and will conclude the project in September 2011.

# Agenda

---

- Project Background
- Project Scope
- Progress During the Reporting Period
- Planned Activities for the Next Reporting Period
- Project Status
- Contacts

# Project Scope

---

**Task 1** - Identify gaps/ issues and requirements between current NIST Synchrophasor testbed and industry needs; develop justified written recommendations for extension of the NIST SynchroMetrology testbed to address these issues, meet the requirements, and add capability to support PAP 12 and 13 and other WASA needs.

**Task 2** - Provide justified written recommendations, including text and models needed for harmonization of DNP3 (now adopted as IEEE 1815) and IEC 61850, and IEEE C37.118 with IEC 61850, in coordination with the PAP12 and PAP13 working groups, with coordination and approval of the Standards Developing Organizations (SDOs).

**Task 3** - Develop recommendation for requirements, testing and certification approaches for PMUs and PDCs, and design for extension of the NIST SynchroMetrology testbed for interoperability testing/standards development. The development of requirements, testing and certification approaches shall be performed in coordination with input from the NIST and North American Synchrophasor Initiative Performance Standards Task Team (NASPI-PSTT).

## Task 1 – Develop recommendations and justifications for NIST SynchroMetrology testbed extension

---

- **Objectives:**

- Identify issues and requirements of current NIST SynchroMetrology testbed
- Develop written recommendations for extension of the NIST SynchroMetrology testbed to address the issues, meet the requirements, and add capability to support PAP 12 and 13 and other WASA needs.

- **Deliverables:**

- Preliminary recommendations for design for enhancement of capabilities and design for extension of the NIST SynchroMetrology testbed (In Quarterly Report #2)
- Final recommendations for design for enhancement of capabilities and design for extension of the NIST SynchroMetrology testbed (In Final Report)

## Task 2: Prepare justified recommendations for harmonization / mapping of relevant standards

### ○ Objectives:

- Provide justified written recommendations, including text and models needed for mapping between DNP3 (now adopted as IEEE standard 1815) and IEC 61850, and IEEE C37.118 with IEC 61850, in coordination with the PAP12 and PAP13 working groups, with coordination and approval of the Standards Developing Organizations (SDOs).

### ○ Deliverables:

- Outline and description of recommendations for the mapping between DNP3 (IEEE Std. 1815) and IEC 61850, covering text, diagrams, and models as input to DNP3 Technical Committee and IEEE Power and Energy Society Substations Working Group C12 sufficient for the completion of PAP12 tasks. (In Quarterly Report #1)
- Recommended changes as input to IEC TC57/WG 10 and the DNP3 Working Group for the mapping between IEC 61850 and DNP3 including text, diagrams, and models. (In Quarterly Report #2)
- Recommendations for harmonization of IEC 61850 and IEEE C37.118, including text, diagrams, and models as input to IEC TC57/WG 10 for the draft document IEC 61850-90-5, sufficient to complete PAP13 tasks (In Quarterly Report #2)
- Recommendations as input to IEC TC57/WG 10 for "amendments to IEC 61850 documents" sufficient to complete PAP13 tasks. (In Quarterly Report #3)
- Recommendations as input to the IEEE Power Systems Relaying Committee (PSRC) WG H11 for amendments to IEEE C37.118.2 document sufficient to complete PAP13 tasks. (In Quarterly Report #3)
- A recommended outline for a "Guideline for Harmonizing C37.118.2 with IEC 61850" sufficient to complete PAP13 tasks. (In Quarterly Report #3)



## Task 3: Develop recommended requirements for PMU and PDC testing and extension of NIST SynchroMetrology testbed

---

- **Objectives:**

- Recommended requirements, testing and certification approaches for PMUs and PDCs, and requirements for extension of the NIST SynchroMetrology testbed for interoperability testing and / or standards development. All in support of NASPI PSTT.

- **Deliverables**

- Recommended requirements for Phasor data concentrators as input to the NASPI PSTT. (In Quarterly Report #1)
- Recommendations for methods for PMU-PDC/PDC-PDC communications as input to the NASPI PSTT (In Quarterly Report #2)
- Recommendations for PDC testing and certification approaches as input to the NASPI PSTT (In Quarterly Report #2)

# Agenda

---

- Project Background
- Project Scope
- Progress During the Reporting Period
- Planned Activities for the Next Reporting Period
- Project Status
- Contacts

## Progress During the Reporting Period

### Task 1: SynchroMetrology Testbed Requirement Analysis

---

- No deliverables were due during this reporting period. However, work has commenced on preliminary recommendations for design for enhancement of capabilities and design for extension of the NIST SynchroMetrology testbed and is progressing well.

## Progress During the Reporting Period

### Task 2: Support PAP12 and PAP13 Activities

---

- The ESTA/QT team has actively participated in all PAP 12 and PAP 13 meetings since the start of the project and has become an integral part of these Priority Action Plan working groups.
- **Priority Action Plan 12 (PAP 12)**
  - To expedite PAP 12 activities in order to develop an approved standard for mapping of IEEE 1815 (DNP Project Profile) and IEC 61850 in 2011, considering the IEEE Standards Committee schedule, the activities in PAP12 were modified and Task 2 activities realigned accordingly.
  - Working closely with PAP 12 members, the ESTA/QT team embarked on a fast track approach of developing the draft IEEE 1815.1 Standard. The ESTA/QT team, using the outline previously prepared by the PAP 12 mapping committee, developed the draft of the standard in IEEE format. The standard is designated as IEEE 1815.1. ESTA/QT team provided weekly revisions of the document to the newly established IEEE WG C14 for review and comment.

## Progress During the Reporting Period

### Task 2: Support PAP12 and PAP13 Activities (Cont.)

---

#### ○ **Priority Action Plan 13 (PAP 13)**

- Major progress has been made by respective Standards Development Organizations in the following areas:
  - IEEE C37.118.2 draft is currently under review by PSRC WG H19
  - IEC 61850-90-5 draft is currently under review by IEC TC57 WG10
- Task 2 of this project involves recommendations for the harmonization of IEC 61850-90-5 with IEEE C37.118.2. However, this work is highly dependent on the outcome of the final version of both standards which have not been resolved yet.
- The ESTA/QT team has members active in PSRC Working Group 14 responsible of C37.118.2 and IEC TC57 Working Group 10 responsible for IEC61850-90-5 and as such is intimately familiar with the developments. The current situation of the two standards has been discussed with PAP13 leadership and the ESTA/QT team has provided preliminary recommendations to PAP 13 for review and discussion at upcoming PAP13 meetings.

## Progress During the Reporting Period

### Task 3: Recommended Requirements, Testing and Certification Approaches for PMUs and PDCs

---

- The scope of work associated with this task (Task 3a) is to recommend requirements for Phasor data concentrators as input to the NASPI PSTT.
- This work was completed on schedule and the recommended functional and performance requirements for Phasor data concentrators are currently under review by the North American Synchrophasor Initiative (NASPI) Performance and Standard Task Force (PSTT).

# Agenda

---

- Project Background
- Project Scope
- Progress During the Reporting Period
- Planned Activities for the Next Reporting Period
- Project Status
- Contacts

## Planned Activities For The Next Reporting Period

### Task 1: SynchroMetrology Testbed Requirement Analysis

---

- The ESTA/QT team will complete preliminary recommendations for design for enhancement of capabilities and design for extension of the NIST SynchroMetrology testbed.



## Planned Activities For The Next Reporting Period

### Task 2: Support PAP12 and PAP13 Activities

---

- The ESTA/QT team will continue to actively participate in all PAP 12 and PAP 13 meetings.
- The ESTA/QT team expects to receive comments and update the document by February 28 before it is released to the IEC Working Group 10 and submitted to IEEE. The ESTA/QT will be issuing draft versions of the draft IEEE1815.1 on a weekly basis incorporating the comments received during the prior week.
- The ESTA/QT team expects to have a clearer view of the status of IEEE C37.118.2 and IEC 61850-90-5 during the next reporting period and continue discussions on its recommendations accordingly.

## Planned Activities For The Next Reporting Period

### Task 3: Recommended Requirements, Testing and Certification Approaches for PMUs and PDCs

---

- ESTA/QT will provide recommendations for methods for PMU-PDC/PDC-PDC communications as input to the NASPI PSTT
- ESTA/QT will provide recommendations for PDC testing and certification approaches as input to the NASPI PSTT

# Agenda

---

- Project Background
- Project Scope
- Progress During the Reporting Period
- Planned Activities for the Next Reporting Period
- Project Status
- Contacts

# Project Status

---

- Project is on schedule
- Active Participation in the new IEEE 1815.1 Standard development have helped expedite the development significantly and helped PAP12 goals.
- Inputs to NASPI/PSTT have helped NASPI/PSTT meet its initial goals.
- PAP 13 developments had a slow start due to evolving changes in the standards. Now that C37.118.2 and IEC 61850-90-5 are closer to being finalized, we expect more progress in the coming periods.

# Contact Information

---



Nader Farah  
ESTA International, LLC  
Office Phone: +1 703 430 2694  
Mobile Phone: +1 703 200 7381  
[nader.farah@ESTAIInternational.com](mailto:nader.farah@ESTAIInternational.com)

Dr. Yi Hu  
Quanta Technology, LLC  
Mobile Phone: +1 919-757-6833  
[yhu@quanta-technology.com](mailto:yhu@quanta-technology.com)